

ABSTRACT OF THE DISCLOSURE

When arranging the geometry of knuckle booms with efficient hydraulic circuits it is sometimes necessary to place the cylinder that provides the reaching force above the boom so that its base area rather than its rod end area provides the boom point motion and force in the pulling direction. It is also sometimes necessary to provide equal areas for both pushing and pulling by further modifying the reach cylinder installation. In the invention, the knuckle boom apparatus has a machine base, a hoist boom and a stick boom. The stick boom has an intermediate pivot pinned to pivot on the distal end of the hoist boom, and a proximal end having a suitable cylinder push point. At least one hydraulic hoist cylinder is mounted between the machine base and the hoist boom, and at least one hydraulic stick cylinder is mounted between the hoist boom and the stick boom. A hydraulic reach cylinder is mounted above the hoist boom between the hoist boom and the suitable push point, whereby when the hydraulic reach cylinder is actuated by supplying oil to its base end, the distal end of the stick boom is withdrawn towards the machine base. The hydraulic circuit has at least one hydraulic conduit line connecting respective base end ports of the hoist and stick cylinders so as to allow hydraulic oil to shunt between base ends of the hoist and stick cylinders.